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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/743,712	12/24/2003	Lev Alexander Prociw	2993-500US RM/bs	8327

32292 7590 04/18/2006

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EXAMINER	
KIM, TAE JUN	

ART UNIT	PAPER NUMBER
3746	

DATE MAILED: 04/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/743,712	PROCIW, LEV ALEXANDER	
	Examiner	Art Unit	
	Ted Kim	3746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 February 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33* is/are pending in the application.

4a) Of the above claim(s) *20-33* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1-19 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The added new matter is that the fuel flows radially outward from the fuel outlet.

"directed *radially outward* relative to the central longitudinal axis to provide *radially outward fuel flow*"

"for directing the fuel *radially outward*"

"the spiral conduit means defining a longitudinal axis and *directing the fuel radially outward therefrom at the fuel outlet means*."

The specification clearly teaches

"[0025] The fuel filmer lip 37 is located at the junction of the inner surface 40 and frustro-conical ring 42 of the air swirler."

"[0030] During operation, the pressurized fuel enters the fuel inlet 60 and fills the fuel inlet cavity 62. The fuel pressure than forces the fuel in the helical channels defined by the helical grooves 56.

> The fuel in each helical channel exits through the corresponding channel exit port 58. The helical motion of the fuel through the helical channels and the shape of the channel exit ports 58 both contribute to producing a swirl in the fuel exiting the fuel distributor 36 and entering the fuel swirling chamber 59. *The swirling fuel is then transformed into a fuel film in a manner similar to standard fuel nozzles, by the interaction of the fuel swirling out of the swirling chamber 59 through an opening defined by the fuel filmer* lip 37 with air exiting the core air passage 52. The fuel film is then atomized by contact with swirling air coming from the bores 44 of the frustro conical ring 42 of the air swirler 34.

Since the fuel is converted to a film after to exiting the exit ports 58 and is on a conical nozzle which by nature goes radially in prior to exit the fuel filmer 37, there is no way that the fuel can be said to flow radially outward from the fuel outlets as they first flow radially inward to e.g. the fuel filmer lip.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 2, 5, 7, 15-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Blakely et al (3,337,135). Blakely et al teach a fuel distributor for a fuel nozzle in a gas turbine engine, the fuel distributor comprising: a pair of concentric tubular bodies 32, 12, having a common central longitudinal axis each having an inlet end and a outlet end, the pair of concentric tubular bodies including an inner body 12 and an outer body 32 having respectively an outer body inner surface and an inner body outer surface adapted

to be in sealing contact one with the other; at least two helical fuel channels 42, 44 adapted to deliver fuel and defined in at least one of the inner and outer surfaces, each helical fuel channel defining several turns around the common central longitudinal axis, each helical fuel channel being in fluid communication with a fuel inlet located at the inlet end; and a channel exit port for each helical fuel channel directed radially *outward* [in an analogous manner to applicant's disclosure] relative to the central longitudinal axis to provide radially outward fuel flow, the channel exit ports being located at the outlet end; wherein the fuel nozzle provides a swirl to the fuel delivered through the helical fuel channels and exiting through the channel exit ports; wherein the outer body and the inner body appear press fit/shrink fit together [alternately this is a product by process claim where the process steps are given little patentable weight]; wherein the inner tubular body further comprises an inner cylindrical passage adapted to deliver air from the inlet end to the outlet end. A fuel distributor for providing a fuel film within a combustion chamber of a combustor in a gas turbine engine, the fuel distributor comprising: fuel inlet means for receiving the fuel; fuel outlet means including a fuel filming means 26; and at least two spiral conduit means 42, 44 for delivering the fuel, the spiral conduit means being in fluid communication with the fuel inlet means and the fuel outlet means; wherein the fuel distributor provides a swirl to the fuel exiting the fuel outlet means; wherein the spiral conduit means are provided by the cooperation of first and second cylindrical surfaces defined by first and second concentric bodies respectively, the first cylindrical surface including spiral groove means and the second cylindrical surface being a continuous wall;

wherein the first body is shrink-fitted into the second body such that the first and second cylindrical surfaces are in sealing contact; wherein at least one of the first and second body further comprises passage means 14 for delivering air to the combustion chamber.

5. Claims 15-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Farago et al (5,067,655). Farago et al teach a fuel distributor [for a fuel nozzle in a gas turbine engine is intended use], the fuel distributor comprising: a pair of concentric tubular bodies 24, 10, having a common central longitudinal axis each having an inlet end and a outlet end, the pair of concentric tubular bodies including an inner body 24, and an outer body 10 having respectively an outer body inner surface and an inner body outer surface adapted to be in sealing contact one with the other; at least two helical fuel 42 channels adapted to deliver fuel and defined in at least one of the inner and outer surfaces, each helical fuel channel defining several turns around the common central longitudinal axis each helical fuel channel being in fluid communication with a fuel inlet located at the inlet end directed radially outward relative to the central longitudinal axis to provide radially outward fuel flow; and a channel exit port for each helical fuel channel, the channel exit ports being located at the outlet end; wherein the fuel nozzle provides a swirl to the fuel delivered through the helical fuel channels and exiting through the channel exit ports; further comprising an outer air passage at the outlet end disposed radially outward of the helical fuel channels and in direct flow communication therewith and wherein the helical fuel channels are defined in the outer surface and the inner surface is an uninterrupted wall; wherein the outlet end of at least the outer surface is frusto-conical

and the channel exit ports are defined by the intersection of the helical fuel channels with the outer surface at the outlet end; wherein the outer body and the inner body appear press fit/shrink fit together [alternately this is a product by process claim where the process steps are given little patentable weight]; wherein the inner and outer bodies define an annular swirl chamber at the outlet end with the frusto-conical surface forming one wall of the swirl chamber, and an annular filming lip near 106 is provided on the inner surface at the outlet end to define an annular exit slot for forming the fuel into a conical film; wherein the inner tubular body further comprises an inner cylindrical passage adapted to deliver air from the inlet end to the outlet end; wherein the outer body includes an annular disc having air swirl apertures. A fuel distributor [for providing a fuel film within a combustion chamber of a combustor in a gas turbine engine is intended use], the fuel distributor comprising: fuel inlet means for receiving the fuel; fuel outlet means including a fuel filming means for directing the fuel radially outward; and at least two spiral conduit means 42 for delivering the fuel, the spiral conduit means being in fluid communication with the fuel inlet means and the fuel outlet means; wherein the fuel distributor provides a swirl to the fuel exiting the fuel outlet means; wherein the spiral conduit means are provided by the cooperation of first and second cylindrical surfaces defined by first and second concentric bodies respectively, the first cylindrical surface including spiral groove means and the second cylindrical surface being a continuous wall; wherein the first body is shrink-fitted into the second body such that the first and second cylindrical surfaces are in sealing contact; wherein at least one of the first and second

body further comprises passage means for delivering air to the combustion chamber; wherein at least one channel has a depth varying along the length of the channel; wherein the depth is varied in a continuous manner; wherein the varying depth provides flow-balancing for the fuel nozzle in order to tune a flow resistance thereof. Note that the distributor of Farago et al is a generic atomizer for liquid and is inherently capable of being used with fuel.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over in view of Lemon et al (5,423,173) in view of Blakely et al (3,337,135) and optionally Farago et al (5,067,655). Lemon et al teach a gas turbine fuel distributor with air swirler 114, central air passage 68, outer air passage 104 and a fuel distributor formed by concentric tubular inner 66 and outer 56 bodies. Lemon et al further teach metering orifices 94 for metering the fuel. Blakely et al teach reduced clogging, reduced pressure losses for helical flow channels (col. 1, lines 67+ and col. 3, lines 39+). It would have been obvious to one of ordinary skill in the art to employ the helical flow channels, including several turns, as taught by Blakely et al, in order to reduce clogging of the

orifices and/or reduce the pressure losses. As for the number and depth of passages, Farago et al teach a number of 3 or more and using a variable depth. It would have been obvious to one of ordinary skill in the art to employ a number of 3 or more and to use variable depth in order to use the workable ranges in the art.

8. Claims 1-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kostka (6,247,317) in view of Blakely et al (3,337,135) and optionally Farago et al (5,067,655). Kostka teaches a gas turbine fuel distributor with air swirler 62, outer air passage 62, and a fuel distributor formed by concentric tubular inner e.g. 51 and outer bodies having a common central longitudinal axis where helical passages are disclosed (col. 3, lines 33+). Blakely et al teach reduced clogging, reduced pressure losses for helical flow channels (col. 1, lines 67+ and col. 3, lines 39+) and using several turns. It would have been obvious to one of ordinary skill in the art to employ the helical flow channels, as taught by Blakely et al, in order to reduce clogging of the orifices and/or reduce the pressure losses. As for the number and depth of passages, Farago et al teach a number of 3 or more and using a variable depth. It would have been obvious to one of ordinary skill in the art to employ a number of 3 or more and to use variable depth in order to use the workable ranges in the art.

9. Claims 1-7, 10-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Farago et al (5,067,655) in view of Blakely (3,337,135). Farago et al teach a fuel distributor [for a fuel nozzle in a gas turbine engine is intended use], the fuel distributor comprising: a pair of concentric tubular bodies 24, 10, having a common central

longitudinal axis each having an inlet end and a outlet end, the pair of concentric tubular bodies including an inner body 24, and an outer body 10 having respectively an outer body inner surface and an inner body outer surface adapted to be in sealing contact one with the other; at least two helical fuel 42 channels adapted to deliver fuel and defined in at least one of the inner and outer surfaces, each helical fuel channel being in fluid communication with a fuel inlet located at the inlet end directed radially outward relative to the central longitudinal axis to provide radially outward fuel flow; and a channel exit port for each helical fuel channel, the channel exit ports being located at the outlet end; wherein the fuel nozzle provides a swirl to the fuel delivered through the helical fuel channels and exiting through the channel exit ports; further comprising an outer air passage at the outlet end disposed radially outward of the helical fuel channels and in direct flow communication therewith and wherein the helical fuel channels are defined in the outer surface and the inner surface is an uninterrupted wall; wherein the outlet end of at least the outer surface is frusto-conical and the channel exit ports are defined by the intersection of the helical fuel channels with the outer surface at the outlet end; wherein the outer body and the inner body appear press fit/shrink fit together [alternately this is a product by process claim where the process steps are given little patentable weight]; wherein the inner and outer bodies define an annular swirl chamber at the outlet end with the frusto-conical surface forming one wall of the swirl chamber, and an annular filming lip near 106 is provided on the inner surface at the outlet end to define an annular exit slot for forming the fuel into a conical film; wherein the inner tubular body further comprises

an inner cylindrical passage adapted to deliver air from the inlet end to the outlet end; wherein the outer body includes an annular disc having air swirl apertures. A fuel distributor [for providing a fuel film within a combustion chamber of a combustor in a gas turbine engine is intended use], the fuel distributor comprising: fuel inlet means for receiving the fuel; fuel outlet means including a fuel filming means for directing the fuel radially outward; and at least two spiral conduit means 42 for delivering the fuel, the spiral conduit means being in fluid communication with the fuel inlet means and the fuel outlet means; wherein the fuel distributor provides a swirl to the fuel exiting the fuel outlet means; wherein the spiral conduit means are provided by the cooperation of first and second cylindrical surfaces defined by first and second concentric bodies respectively, the first cylindrical surface including spiral groove means and the second cylindrical surface being a continuous wall; wherein the first body is shrink-fitted into the second body such that the first and second cylindrical surfaces are in sealing contact; wherein at least one of the first and second body further comprises passage means for delivering air to the combustion chamber; wherein at least one channel has a depth varying along the length of the channel; wherein the depth is varied in a continuous manner; wherein the varying depth provides flow-balancing for the fuel nozzle in order to tune a flow resistance thereof. Note that the distributor of Farago et al is a generic atomizer for liquid and is inherently capable of being used with fuel. Farago et al as applied above teach an atomizer with reduced whirl losses (col. 1, lines 43+) but do not teach the use of fuel or a gas turbine combustor nor the use of several . Blakely et al

teach it is old and well known in the art to employ helical swirl devices for atomizing the fuel of a gas turbine combustor and employing several turns. It would have been obvious to one of ordinary skill in the art to employ the helical swirl atomizer of Farago et al, in a gas turbine combustor, as a well known device requiring low loss atomization. It would have been obvious to one of ordinary skill in the art to employ several turns as taught by Blakely et al, in order to facilitate a shorter atomizer with less flow losses.

Response to Arguments

10. Applicant's arguments filed 02/03/2006 have been fully considered but they are not persuasive.

11. Applicant argues limitations that are not supported by his specification and present new matter to distinguish over the art of record. These arguments are not persuasive and the prior art teach an analogous configuration as disclosed and are thus each as capable of having radially outward flow as applicant following the ejection of the fluid at some point downstream from the fuel exits.

12. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., applicant's airblast or air assist atomizers) are not recited in at least the independent claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Each of the applied art teaches the air in the manner that it is claimed..

13. Applicant's arguments with respect to claim 1 amend around Farago et al for the 35 USC 102 rejection but are not persuasive for claim 15 for the same reasons set forth above. Furthermore, the added limitations are taught by Blakely et al and thus do not distinguish over the art of record.

14. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Ted Kim whose telephone number is 571-272-4829. The Examiner can be reached on regular business hours before 5:00 pm, Monday to Thursday and every other Friday.

The fax numbers for the organization where this application is assigned are 571-273-8300 for Regular faxes and 571-273-8300 for After Final faxes.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Thorpe, can be reached at 571-272-4444.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist of Technology Center 3700, whose telephone number is 703-308-0861. General inquiries can also be directed to the Patents Assistance Center whose telephone number is 800-786-9199. Furthermore, a variety of online resources are available at http://www.uspto.gov/main/patents.htm

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